

Given a polynomial divisor and dividend, use long division to find the quotient and remainder.

$$1. (18x^3 - 3x^2 + x - 1) \div (x^2 - 4) = \frac{18x - 3}{x^2 - 4} + \frac{73x - 13}{x^2 - 4}$$

$$\begin{array}{r} x^2 - 4 \overline{) 18x^3 - 3x^2 + x - 1} \\ \underline{-(18x^3 - 72x)} \downarrow \\ -3x^2 + 73x - 1 \\ \underline{-(-3x^2 + 12)} \\ 73x - 13 \end{array}$$

$$2. (6x^4 + x^3 - 9x + 13) \div (x^2 + 8) = \frac{6x^2 + x - 48}{x^2 + 8} + \frac{-x + 397}{x^2 + 8}$$

$$\begin{array}{r} x^2 + 8 \overline{) 6x^4 + x^3 + 0x^2 - 9x + 13} \\ \underline{-(6x^4 + 48x^2)} \downarrow \downarrow \\ x^3 - 48x^2 - 9x + 13 \\ \underline{-(x^3 - 8x)} \\ -48x^2 - x + 13 \\ \underline{-(-48x^2 - 384)} \\ -x + 397 \end{array}$$

$$3. (x^3 + 25x^2 + 100x) \div (x + 20)$$

$$\begin{array}{r} x + 20 \overline{) x^3 + 25x^2 + 100x} \\ \underline{-(x^3 + 20x^2)} \\ 5x^2 + 100x \\ \underline{-(5x^2 + 100x)} \\ 0 \end{array}$$

Given a polynomial $p(x)$, use synthetic division to divide by $x - a$ and obtain the quotient and the (nonzero) remainder.

$$4. (7x^3 - 4x^2 - 400x - 100) \div (x - 8)$$

$$\begin{array}{r|rrrr} 8 & 7 & -4 & -400 & -100 \\ & \downarrow & 56 & 416 & 128 \\ \hline & 7 & 52 & 16 & 28 \end{array}$$

$$\left(7x^2 + 52x + 16\right) + \frac{28}{x - 8}$$

$$5. (2.5x^3 + 6x^2 - 5.5x - 10) \div (x + 1)$$

$$\begin{array}{r|rrrr} -1 & 2.5 & 6 & -5.5 & -10 \\ & \downarrow & -2.5 & -3.5 & 9 \\ \hline & 2.5 & 3.5 & -9 & -1 \end{array}$$

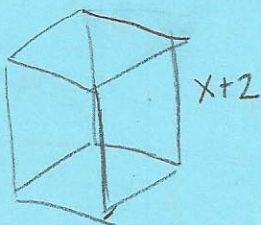
$$\left(2.5x^2 + 3.5x - 9\right) + \frac{-1}{x + 1}$$

6. $(3x^3 - 11x^2 - 56x - 50) \div (x + 4)$

$$\begin{array}{r} -4 \overline{) 3 \quad -11 \quad -56 \quad -50} \\ \underline{\downarrow -12 \quad 92 \quad -144} \\ 3 \quad -23 \quad 36 \quad -194 \end{array}$$

$$\left(3x^2 - 23x + 36 \right) + \frac{-194}{(x+4)}$$

7. Given that the height of a rectangular prism is $x + 2$ and the volume is $x^3 - x^2 - 6x$, write an expression that represents the area of the top face of the prism.



$$V = \text{A of Base} \times \text{height}$$

$$\frac{x^3 - x^2 - 6x}{x+2} = \text{A of Base} \cdot \frac{(x+2)}{(x+2)}$$

$$\text{Area of Base} = x^2 - 3x$$

$$\begin{array}{r} -2 \overline{) 1 \quad -1 \quad -6 \quad 0} \\ \underline{\downarrow -2 \quad 6} \\ 1 \quad -3 \quad 0 \\ x^2 - 3x \end{array}$$

8. Explain the error: Two students used synthetic division to divide $3x^3 - 2x - 8$ by $x - 2$. Determine which solution is correct. Find the error in the other solution.

A.	B.
$\begin{array}{r} \checkmark 2 \overline{) 3 \quad 0 \quad -2 \quad -8} \\ \underline{ 6 \quad 12 \quad 20} \\ 3 \quad 6 \quad 10 \quad 12 \end{array}$	$\begin{array}{r} 2 \overline{) 3 \quad 0 \quad -2 \quad -8} \\ \underline{ -6 \quad 12 \quad -20} \\ 3 \quad -6 \quad 10 \quad -28 \end{array}$

Incorrect

→ should be 6 not -6

$$\begin{array}{r} 2 \overline{) 3 \quad 0 \quad -2 \quad -8} \\ \underline{\downarrow 6 \quad 12 \quad 20} \\ 3 \quad 6 \quad 10 \quad 12 \end{array}$$

Review

Graph the function $f(x) = \begin{cases} (x+2)^2, & x < 0 \\ -1, & x > 0 \end{cases}$

